Appl. No. : **10/663,318**
Filed : **September 16, 2003**

REMARKS

Claims 1-15 are currently pending.

Rejections Under 35 U.S.C. §102

Claims 1-2, 5-6, and 11-14 are rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,471,913 to Weaver et al. Applicants respectfully disagree that Claims 1-2, 5-6, and 11-14 are anticipated by Weaver et al.

The Examiner contends that the recited limitation of "'removing the conductive material with small grains faster than the conductive material with large grains' is only a statement of the inherent properties of the process." However, Weaver et al. do not teach or suggest annealing the layer of conductive material to establish a grain size differential between the conductive material which covers the field regions and the conductive material which fills in the features by forming small grains in the conductive material covering the field regions and large grains in the conductive material over and filling the features, and removing the conductive material with small grains faster than the conductive material with large grains, as recited in Claim 1. Weaver et al. teach to anneal the copper layer to accelerate the stabilization of "the grain structure of the copper film by significantly reducing the amount of time required for film re-crystallization to occur (i.e. transforming many small grains into fewer large grains). The accelerated annealing process . . . also ***minimizes the variation in grain size distribution*** which is seen to occur during a room-temperature self-annealing process." Weaver et al., at Col. 8, lines 59-67 (emphasis added). Weaver et al. also teach that "the accelerated annealing process reduces the time required for the CMP process, wile improving its uniformity, predictability and repeatability." *Id.*, at Col. 9, lines 7-9.

In contrast, in the claimed invention, the layer of conductive material is annealed to establish ***a grain size differential*** between the conductive material which covers the field regions and the conductive material which fills in the features by forming small grains in the conductive material covering the field regions and large grains in the conductive material over and filling the features. Weaver et al. do not teach annealing ***to establish a grain size differential*** and removing the conductive material with small grains faster than the conductive material with large grains, as recited in Claim 1. Instead, Weaver et al. teach the opposite: an accelerated annealing process

for ***minimizing variation in grain size distribution*** for the purposes of reducing CMP time and for improving CMP uniformity. Since Weaver et al. fail to establish a grain size differential, and in fact teaches away from it, it cannot remove small grains faster than large grains, inherently or otherwise, contrary to the present claims.

Claim 1 is therefore patentable as it is not anticipated by Weaver et al. Claims 2, 5-6, and 11-14, which depend from and include all of the limitations of Claim 1, are also patentable over Weaver et al. Furthermore, each of the dependent claims recites further distinguishing features of particular utility.

Rejections Under 35 U.S.C. §103

Claims 3-4, 7-10, and 15 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,471,913 to Weaver et al. As discussed above, independent Claim 1 is patentable over Weaver et al. Weaver et al. do not teach or suggest annealing ***to establish a grain size differential*** and removing the conductive material with small grains faster than the conductive material with large grains, as recited in Claim 1.

Furthermore, the Examiner provides no support for meeting the dimensional limitations of Claims 3-4 and 7-10, instead relying on "routine optimization." The Examiner fails to appreciate the significance of these dimensional limitations to the establishment of grain size differentials. *See* Specification, at p. 10, lines 3-7. Weaver et al. fail to appreciate this significance and therefore do not: (1) recognize a result-effective variable in the relative thickness; nor (2) provide a mechanism to control the relative thickness. In other words, Weaver et al. neither recognize a desire to optimize nor enable a means to optimize the relative thicknesses. Nor can the Examiner rely solely on schematic Fig. 2E for these teachings.

Claims 3-4, 7-10, and 15, which depend from and include all of the limitations of Claim 1, are therefore also patentable over Weaver et al. Furthermore, each of the dependent claims recites further distinguishing features of particular utility.

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Conclusion

Applicants respectfully submit that all of the pending claims are patentably distinguishable over the prior art of record. The cited references, either alone or in combination, do not teach or suggest Applicants' claimed invention.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

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By: _____

Adeel S. Akhtar
Registration No. 41,394
Attorney of Record
Customer No. 20,995
(415) 954-4114

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